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SHORT QUESTIONS

Q.1 How the orbits of planets will be modified if the planets were electrically charged?
(BWP 2009, 2011, SGD 2009)

Q.2 How sharks locate their prey? Explain. **(SGD 2018)**

Q.3 Electric lines of force never cross each other, why? **(LHR 2019; GRW 2019; SWL 2019) (SGD 2019; RWP 2019)**

Q.4 If a point charge q of mass m is released in a non-uniform electric field with lines pointing in the same direction, will it make a rectilinear motion?
(BWP 2011, SGD 2016, DGK 2018, MTN 2010, LHR 2008, LHR 2021)

Q.5 Describe the force or forces on a positive point charge when placed between parallel plates with similar and equal charges.
(GRW 2010, LHR 2009, RWP 2008, LHR 2016)

Q.6 Suppose that you follow an electric field line due to a positive point charge. Do electric field and the potential increase or decrease?
(SGD 2018, GRW 2010, 2016)(LHR 2010, 2016, 2018; MTN 2009, 2019; FSD 2010, 2016, 2019)

Q.7 Define electron volt and its value. **(LHR 2019)**

Q.8 Define potential gradient and show that $E = -\Delta v/\Delta r$.
(FSD 2019)

Q.9 Define surface charge density. Also give its units.
(MTN 2021)

Q.10 What are dissimilarities between electric and gravitational forces? **(MTN 2021, SGD 2021)**

Q.11 Do electrons tend to go to region of high potential or of low potential?
(LHR 2016, 2019; GRW 2006, 2009; BWP 2008, 2009, MTN 2008, 2018)(FSD 2008, 2011; SGD 2010, 2011, RWP 2008; SWL 2019, LHR 2021, GRW 2021, SGD 2021, FSD 2021)

Q.12 A particle carrying a charge of 2e falls through a potential difference of 3.0V. Calculate the energy acquired by it. **(SGD 2016; GRW 2019; SWL 2019)**

Q.13 Potential is constant throughout the given region of space. Is the electric field is zero and non-zero in the region. **(SGD 2019)**

Q.14 Write two differences between electric and gravitational forces. **(FSD 2019)**

Q.15 Define electric potential and potential difference.
(GRW 2019, MTN2019)

Q.16 Describe the force or forces on a positive point charge when placed between parallel plates. **(GRW 2019)**
(a) With similar and equal charges
(b) With opposite and equal charges

Q.17 Define electric flux and give its dependence.
(LHR 2008, DGK 2008, 2018; MTN2019)

Q.18 Is it true gauss's law state that the total no of lines of force crossing any low surface in the outward direction is proportional to net positive charge include within surface. **(MTN 2019)**

Q.19 Why $\vec{E}$ is zero inside a charged rubber balloon where charge is distributed uniformly over it surface?
(GRW 2009, 2010, LHR 2010, BWP 2008, SGD 2016, FSD 2009, 2010; RWP 2019, MTN 2021)

Q.20 State Gauss's Law and find, electric intensity due to an infinite sheet of charge.
(LHR 2009, 2011, 2014, 2019; GRW 2011; MTN 2013, RWP 2015)(BWP 2015, DGK 2013)

Q.21 Define di-electric constant and write its formula.
(SGD 2018, LHR 2021)

Q.22 What is meant by Electric polarization?
(LHR 2018, SGD 2018, FSD 2008)

Q.23 The time constant of a series RC circuit is $t = RC$ verify that an Ohm times farad is equivalent to second.
(LHR 2016, GRW 2016, SGD 2014, 2018, MTN 2011, 2016, BWP 2010)

Q.24 What depend on the slow or fast charging discharging of a capacitor? **(DGK2011, MTN 2018)**

Q.25 How can you identify that which plate of a capacitor is positively charged?
(MTN 2021, SGD 2021, FSD 2021)

Q.26 State Gauss's law and write its mathematical expression. **(SGD 2021)**

Q.27 A potential difference is applied across the ends of a copper wire. What is the effect on the drift velocity of free electron by
(i) Increasing the potential difference.
(ii) Decreasing the length and the temperature of the wire.
(LHR 2002, 2003, 2005, 2006, 2009, 2010, 2012, 2013, 2014, 2016)(MTN 2009, 2011)(BWP 2004, 2008, 2012)(DGK 2005, 2006)

Q.28 Is the filament resistance and lower and higher in 500 W, 220 V light bulb than in 100 W, 220 V.
(FSD 2019, MTN2019; SGD 2019)

Q.29 Describe a circuit which will give a continuously varying

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(A) Cadmium rods (B) Iron rods (C) Platinum rods (D) Steel rods

190. Nuclear fission chain reaction is controlled by using: (MTN 2016)

(A) Steel rods (B) Graphite rods (C) Cadmium rods (D) Platinum rods

191. The most useful tracer isotope for the treatment of Thyroid gland is: (MTN 2016)

(A) Cobalt 60 (B) Carbon 14 (C) Iodine -131 (D) Strontium 90

192. The number of Neutrons in $^{238}_{92}U$ is: (MTN 2016)

(A) 92 (B) 238 (C) 146 (D) 330

193. A proton is consist of quarks which are: (SWL 2018)

(A) 2 up, 1 down (B) 1 up , 2 down (C) all up (D) all down

194. Absorbed dose is defined as: (SWL 2018)

(A) M/e (B) E/e (C) C/M (D) E/M

195. Which group belongs to hadrons? (FSD 2019)

(A) Protons & neutrons (B) Measons & neutrino's

(C) Photons & electrons (D) Protons & electrons

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(A) 1/2 time (B) ¼ times (C) 1/16 times (D) 16 times

164. Life time of an election in an excited state is about 10^{-8} S. what is its uncertainty in energy (LHR 2019)

(A) $6.63\times10^{-34}J$ (B) $9.1\times10^{-31}J$

(C) $6.63\times10^{-26}J$ (D) $7.2\times10^{-15}J$

165. In the spectrum of which of the following will you find Balmer series: (LHR 2006, 2009,2018)

(A) Oxygen (B) Nitrogen (C) Hydrogen (D) All of these

166. X-rays are similar in nature to: (LHR 2008) (MTN 2018)

(A) Alpha rays (B) Beta rays (C) Cathode rays (D) Gamma rays

167. Balmer series lies in the: (MTN 2019)(LHR 2010,2018)

(A) Ultraviolet region (B) Far ultraviolet region

(C) Infrared region (D) Visible region

168. Balmer series lies in the: (LHR 2016)

(A) Ultraviolet region (B) Far ultraviolet region

(C) Infrared region (D) Visible region

169. Electron can reside in excited state for about: (GRW 2011, 2019)

(A) 10^{-3} sec (B) 10^{-5} sec (C) 10^{-8} sec (D) 10^{-11} sec

170. Balmer series lies in: (GRW 2016,2018)

(A) Infrared region (B) Visible region

(C) Ultraviolet region (D) Far ultraviolet region

171. The relation for paschal series is given as: (LHR 2019)(SGD 2016)

(A) $\frac{1}{\lambda}=R_N\left(\frac{1}{2^2}-\frac{1}{n^2}\right)$ (B) $\frac{1}{\lambda}=R_N\left(\frac{1}{3^2}-\frac{1}{n^2}\right)$

(C) $\frac{1}{\lambda}=R_N\left(\frac{1}{4^2}-\frac{1}{n^2}\right)$ (D) $\frac{1}{\lambda}=R_N\left(\frac{1}{5^2}-\frac{1}{n^2}\right)$

172. The total number of spectral lines for an electron transition form n = 5 to n = 1 states is: (GRW 2019)(MTN 2011)

(A) 1 (B) 5 (C) 7 (D) 10

173. Production of X – rays is the reverse process of: (MTN 2016)

(A) Complon effect (B) Pair production (C) Pair annihilation (D) Photo electric effect

174. In electronic transition, atom cannot emit: (MTN 2016)

(A) γ rays (B) Ultraviolet rays (C) Visible light (D) Infrared

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(MTN 2006, 2014)(GRW 2008)(FSD 2005)(MP 2009) (FSD 2008, 2013)(BWP 2015) (LHR 2010, 2014, 2015) (RWP 2014, 2015)

Q.167 What is the net charge on a n-type or a p-type substance?
(LHR 2000, 2001, 2005, 2008, 2012, 2016, 2019) (RWP 2002, 2003, 2006, 2009, 2014) (GRW 2003, 2004, 2005, 2014, 2015)(FSD 2013, 2018) (MTN 2015) (DGK 2018)

Q.168 How does the motion of an electron in n-type substance differ from the motion of holes in a p-type substance?
(LHR 2016) (GRW 2016)(FSD 2009)(SGD 2011) (MTN 2008, 2010, FSD 2021)

Q.169 What is the biasing requirement of the junctions of a transistor for its normal operations? Explain how these requirements are met in a common emitter amplifier.**(FSD 2021)**

Q.170 What are the measurements on which two observers in relative motion will always agree upon?
(LHR 2001, 2003, 2005, 2008)(GRW 2004) (FSD 2003, 2014)

Black Body Radiations

Q.171 What are the black body radiations? **(LHR 2019)**

Q.172 As a solid is heated and begins to glow, why does it first appear red?
(LHR 2005, 2006, 2014, 2019)(GRW 2003, 2004, 2005, 2006, 2007, 2008, 2009), (LHR 2006, 2008)(DGK 2008, 2011)(MTN 2004, 2005, 2006, 2007, 2008, 2009, 2014)(DGK 2005, 2014)(BWP 2000, 2014, SGD 2021)

Q.173 Photon 'A' has twice the energy of photon 'B'. What is the ratio of the momentum of 'A' to that of 'B'?
(SGD 2003)(MTN 2004)(RWP 2005)(BWP 2007) (LHR 2019)(DGK 2014, LHR 2014, 2015, 2016, GRW 2005, 2007, 2010, 2014, 2015, 2016)

Q.174 What happens to total radiation from a black body if its absolute temperature is doubled?
(SGD 2003), (MTN 2004, 2015), (RWP 2005), (BWP 2007, 2015)

Q.175 As a solid heated and begins to glow. Why does it first appear red? **(SWL 2019)**

Q.176 Which has lower energy quanta? Radio waves or X rays. **(MTN2019)**

Q.177 A beam of red light and a beam of blue light have exactly the same energy. Which beam contains the greater number of photons?
(LHR 2001, 2005, 2007, 2008, 2011)(MTN 2005) (BWP 2008) (RWP 2005) (FSD 2008) (MP 2006, 2007, 2008, 2009)

Q.178 Which photon, red, green, or blue carries the most (a) energy and (b) momentum?
(LHR 2014, 2015, 2019)(GRW2005)(BWP 2006)

Q.179 Which has the lower energy quanta? Radio waves or X-rays.
(FSD 2000, 2001, 2007, 2010, 2014, 2015) (LHR 2014, 2015) (BWP 2005, 2009, 2014) (GRW 2014, 2015) (RWP 2014) (LHR 2006)(GRW 2016)(RWP 2008, 2021)

Q.180 Does the brightness of a beam of light primarily depend on the frequency of photons or on the number of photons?
(LHR 2001, 2002, 2005, 2007, 2010) (GRW 2004, 2009) (FSD 2003, 2008)

Q.181 When ultraviolet light falls on certain dyes, visible light is emitted. Why does this not happen when infrared light falls on these dyes?
(LHR 2001, 2003, 2005, 2008)(GRW 2004) (FSD 2003)

Interaction of Radiation with Matter

Q.182 Will bright light eject more electrons from a metal surface than dimmer light of the same colour?
(MTN 2006, 2009, 2013, 2015, 2021)(GRW 2015) (LHR 2006)(FSD 2006)(DGK 2006, 2011, 2015) (BWP 2007, 2008)(SGD 2018)

Q.183 Will higher frequency light eject greater number of electrons than low frequency light?
(RWP 2002, 2003, 2006, MTN 2005, 2008; LHR 2019, MTN 2021)

Q.184 When light shines on a surface, is momentum transferred to the metal surface?
(LHR 2004)(SGD 2005)(MTN 2005, 2015) (FSD 2005) (MP 2006) (GRW 2005, 2009) (BWP 2008) (AJK 2015)(DGK 2015)

Q.185 Why can red light be used in a photographic dark room when developing films, but a blue or white light cannot?
(LHR 2005, 2006)(GRW 2003, 2004, 2005, 2006, 2007, 2008, 2009)(MTN 2004, 2005, 2006, 2007, 2008, 2009)(DGK 2005)(BWP 2000)

Q.186 Why don't we observe a Compton Effect with visible light?

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Q.210 What do we mean when say that the atom is excited? **(SGD 2011, FSD 2009, 2011)(BWP 2008, 2015, 2019; GRW 2006, 2010, 2019; LHR 2001, 2005, 2007, 2008, 2011) (MTN2005, 2018, RWP 2005, 2019 FSD 2008, 2010, 2015, MP 2006, 2007, 2008, 2009, FSD 2021, SWL 2021)**

Q.211 Can X-rays be reflected, refracted, diffracted and polarized just like any other waves? Explain. **(LHR 2001, 2005, 2011, 2019; MTN 2005,2019; BWP 2008, 2014, SGD 2009,2019; RWP 2005) (MP 2007, 2009, DGK 2014, AJK 2015, FSD 2008, GRW 2010, 2016)**

Q.212 How does a K_α X-ray differ from a K_β X-ray? **(LHR 2010;FSD 2019)**

Q.213 Explain inner shell transitions and X-rays production. **(GRW 2014, DGK 2013, 2014, MTN 2013, LHR 2015, 2019)**

Q.214 Define Ionization and Excitation potential. **(MTN 2016; LHR 2019;SGD 2019; DGK 2019)**

Q.215 What is CAT scan? **(SGD 2018;SWL 2019, SGD 2021)**

Q.216 What are the uses of x-rays? **(DGK 2018)**

LASER

Q.217 What are the advantages of LASERs over ordinary light? **(MTN 2015, 2019;SWL 2014,2019;FSD 2019) (LHR 2006, 2007, 2009, 2010, 2011, 2012, 2014, 2015, 2016, 2019) (FSD 2005, 2006, 2012, 2014, GRW 2003, 2008, 2010, 2014, 2015, DGK 2015; RWP 2019, LHR 2021)**

Q.218 Define normal population and population inversion. **(DGK 2008, 2009, 2011, GRW 2011)**

Q.219 Write down application of LASER. **(BWP 2019, FSD 2021)**

Q.220 How does stimulated emission differ from spontaneous emission? **(FSD 2010, LHR 2010;FSD 2019)**

Q.221 Explain why laser action could not occur without population inversion between atomic levels? **(MTN 2009, 2019 DGK 2000, 2005, 2006, LHR 2006, 2007, 2010, 2012, 2013, 2015, 2019) (BWP 2007, SGD 2005, 2018, FSD 2005, 2006, 2019; GRW 2005, 2006, 2007, 2008, 2009) (FSD 2005, 2018, MP 2009)**

Q.222 What is He- Neon Laser? **(LHR 2021)**

Q.223 What is the biological effect of x-rays? **(SWL 2021)**

Q.224 Define mass defect and binding energy? **(LHR 2012, 2014, 2019; MTN 2012,2018, SGD 2012, 2018, FSD 2008, 2013;(GRW 2019;DGK 2019, BWP 2019)**

Q.225 Which elements have maximum binding energy per nucleon value and what is its value? **(LHR 2010, 2012, FSD 2009)**

Q.226 Find the binding energy for Deuterium?

Q.227 Find the mass defect of tritium. If the atomic mass of tritium 1 .0116048 u **(FSD 2019, 2021)**

Interaction of Radiation with Matter

Q.228 Explain how "α" and "β" particles may ionize an atom without directly hitting the electrons? What is the difference in the action of the two particles for producing ionization? **(GRW 2010)**

Q.229 State two characteristics of $\beta-$ particle. **(RWP 2011)**

Q.230 A particle which produces more ionization is less penetrating. Why? **(LHR 2011, 2012, 2019; GRW 2010, 2013, 2014, RWP 2009, DGK 2008, 2009, 2010)(MTN 2009, 2011, 2013, FSD 2009, 2012, SGD 2011, 2012, 2018, MTN 2021)**

Q.231 If someone accidently swallow an $\alpha-$ source and a $\beta-$ source, which would be the more dangerous to him? Explain why? **(LHR 2014, DGK 2011, FSD 2008; MTN 2019)**

Q.232 Describe a brief account of interaction of radiation of various type of radiations with matter. **(LHR 2018, RWP 2010, SGD 2009)**

Half Life

Q.233 If a nucleus has a half-life of 1 year, does this mean that it will be completely decayed after 2 years? Explain. **(GRW 2011, RWP 2009, DGK 2011; MTN 2019, LHR 2021)**

Q.234 What fraction of a radioactive sample decays after two half-lives have elapsed? **(DGK 2018; SWL 2019)**

Q.235 What do you mean by decay constant of element? **(LHR 2013, SGD 2010, MTN 2010, FSD 2013; SWL 2019)**

Q.236 Define half-life of a radioactive element. **(GRW 2014, LHR 2009, DGK 2018;BWP 2019)**

Q.237 What is radioactive decay? Give an example. **(LHR 2019)**

Radiation Detectors

Q.238 What information is revealed by the length and shape of the tracks of an incident particle in Wilson cloud chamber? **(GRW 2010, 2008, SGD 2018, 2019; MTN 2019, FSD 2021)**

Q.239 Briefly explain what is meant by Quenching?

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26. **In Millikan's oil drop experiment a charged particle of mass 'm' is in equilibrium in an applied electric field E. If the direction of electric field is reversed then acceleration of particle will be: (SWL 2018)**

(A) Zero (B) g/2 (C) g (D) 2g

27. **A particle carrying a charge 2e falls through P.D of 3 V. the energy acquired by it is:**

(A) $9.6\times10^{-18}\,J$ (B) $9.6\times10^{-19}\,J$ (C) $1.6\times10^{-19}\,J$ (D) $9.6\times10^{-12}\,J$

28. **The power output of a lamp is 6 W. How much energy does the lamp give out in 2 minutes? (FSD 2019) (LHR 2011)(GRW 2009)**

(A) 3 J (B) 12 J (C) 120 J (D) 720 J

29. **Siemen is the unit of: (GRW 2010, 2011)**

(A) Resistance (B) Conductance (C) Resistivity (D) Conductivity

30. **Two parallel wires carrying current in the same direction: (GRW 2016) (MTN2018,2018) (GRW 2018)**

(A) Attract each other (B) Repel each other
(C) Cancel their fields (D) No effect on each other

31. **The graphical representation of Ohm's law is: (FSD 2009)(SGD 2011)**

(A) Hyperbola (B) Ellipse (C) Parabola (D) Straight line

32. **A wire of uniform area of cross – section A and length L is cut into two equal parts. The resistance of each part becomes: (MTN 2019) (SGD 2011)**

(A) Double (B) Half (C) 4 time (D) ¼ time

33. **Temperature coefficient of resistance (α) is equal to: (SGD 2016)**

(A) $\frac{R_1+R_\circ}{R_\circ\Delta t}$ (B) $\frac{R_\circ-R_1}{R_\circ\Delta t}$ (C) $\frac{R_1-R_\circ}{R_\circ\Delta t}$ (D) None of these

34. **One coulomb of charge is created by: (LHR 2019)(MTN 2019) (RWP 2009)**

(A) 10 Electrons (B) 1.6×10^{-19} electrons
(C) 6.25×10^{18} electrons (D) 6.25×10^{21} electrons

35. **Which one of the following represents ohm's law: (GRW 2018) (RWP 2009)**

(A) V = IR (B) I = V/R (C) R = V/I (D) All of these

36. **The colour code for carbon Resistances usually consists of: (DGK 2011)(MTN 2009)**

(A) 2 bands (B) 4 bands (C) 5 bands (D) 7 bands

37. **1 Ohm is defined as: (BWP2011)(MTN 2011)**

(A) IVC^{-1} (B) IVA^{-1} (C) ICV^{-1} (D) IVA

38. **Solid bodies are charged due to the transfer of: (MTN 2009) (LHR 2018)**

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on your radio set?
(GRW 2009, 2016)(SGD 2011, 2016) (FSD 2008, 2009) (MTN 2008, 2009)(BWP 2009) (DGK 2011) (LHR 2007, 2009, 2011, 2014, 2016) (DGK 2000, 2002, 2005, 2009, 2013)(BWP 2000, 2005, 2007, 2008, 2011, 2015)(FSD 2005, 2009, 2014) (FSD 2002, 2005, 2006, 2008, 2012)

Q.113 Explain the conditions under which electromagnetic waves are produced from a source?
(BWP 2009)(MTN 2009)(GRW 2009)(RWP 2003)(FSD 2005)(MP 2006, 2007, 2008, 2009)

Q.114 A choke coil placed in series with an electric lamp in an A.C. circuit causes the lamp to become dim. Why is it so? A variable capacitor added in series in this circuit may be adjusted until the lamp glows with normal brilliance. Explain, how this is possible?
(LHR 2002, 2004, 2007, 2009, 2012, 2019) (MTN 2009, 2018) (DGK 2005, 2006) (FSD 2005) (MP 2010) (RWP 2008, 2010) (SWL 2019)

Q.115 A sinusoidal current has rms value of 10A.What is the maximum or peak value?
(LHR 2008, 2009, 2018)(GRW 2011, 2016) (RWP 2010) (FSD 2008, 2009, 2011)(SGD 200910, 2011, 2018)(LHR 2004, 2006, 2009, 2014, 2016) (MP 2004, 2005, 2006)(FSD 2005, 2007, 2010) (MTN 2004, 2005, 2006, 2010, 2015)(DGK 2000, 2005, 2006, 2013, 2015) (BWP 2015)(AJK 2015) (FED 2019)

Q.116 Explain the power dissipation in an inductor. **(LHR 2021)**

Q.117 At what frequency will an inductor of inductance 1.0H have reactance of 5000Ω. **(SGD 2021)**

Q.118 Define impedance and write its S.I units. **(SWL 2021)**

Q.119 Why the choke is used in A.C circuits. **(FSD 2021)**

Q.120 Distinguish between crystalline, amorphous and polymeric solids?
(FSD 2006, 2009, 2013, 2019)(SGD 2009)(BWP 2008, 2009, 2010)(DGK 2008, 2018)(MTN 2008, 2009, 2016) (LHR 2002, 2003, 2006, 2007, 2016) (GRW 2001, 2004, 2008) (MTN 2000, 2004, 2007, 2009) (FSD 2019, MTN 2021)

Q.121 Define stress and strain. What are their SI units? Differentiate between tensile, compressive and shear modes of stress and strain.
(LHR 2000, 2004, 2013, 2016, 2019) (DGK 2006, 2008, 2009, 2018, FSD 2002, 2003, 2006, 2008, 2013, SGD 2018, 2021)

Q.122 Differentiate between brittle and ductile substances?
(GRW 2010; MTN2019)

Q.123 Draw a stress strain curve for a ductile material, and then define the terms: Elastic limit, Yield point and Ultimate tensile stress?
(LHR 2008)(GRW 2009)(SGD 2011) (LHR 2007, 2008) (RWP 2008) (GRW 2009) (MP 2009) (MTN 2018)

Q.124 Define modulus of elasticity. Show that the units of modulus of elasticity and stress are the same. Also discuss its three kinds.
(LHR 2001, 2003, 2005, 2006, 2016, 2018, MP 2004, DGK 2004, 2007; MTN2019, SGD 2021)

Q.125 What is meant by strain energy? How can it be determined from the force-extension graph?
(LHR 2002, 2005, 2012, 2013, 2016, 2018, MP 2004, FSD 2008)

Q.126 Differentiate between tensile, compressive and shear modes of stress and strain.
(LHR 2006, GRW 2007, 2009, 2011, 2016, RWP 2010, SGD 2008, 2016, FSD 2009)

Q.127 Define Strain Energy. Find value of Strain Energy in a deformed material.
(LHR 2009, 2016, 2018, 2019, SGD 2014, BWP 2013, DGK 2015, SWL 2021)

Q.128 Distinguish between conductors, insulators, semi-conductors with the help of energy band theory?
(LHR 2008, 2010)

Q.129 What is meant by hysteresis loop?
(SGD 2009, GRW 2009; SWL 2019)

Q.130 What are hard & soft magnetic materials?
(FSD 2018, 2021)

Q.131 What do you mean by Curie temperature? Write the curie temperature of iron? **(SWL 2019)**

Q.132 What are the superconductors?
(LHR 2019, MTN 2021)

Q.133 What is meant by paramagnetic, diamagnetic and ferromagnetic substances? Give examples for each.
(GRW 2010, 2011, 2016, 2019, LHR 2007, 2019, 2011, 2013, SGD 2009, 2018)(FSD 2009, 2019, MTN 2008, 2010, 2011, SGD 2003, MTN 2009, 2018, MP 2006, 2009)

Q.134 Discuss the mechanism of electrical conduction by holes and electrons in a pure semiconductor element.
(SGD 2005; FSD 2019, BWP 2008, MTN 2009)

Q.135 What is meant by strain energy? **(LHR 2019)**

Q.136 Distinguish between crystalline and amorphous solids?

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1. **In the Xerographic machine the heart of the machine "drum" is made of:** **(LHR 2007) (MTN 2018)**

   (A) Ceramic (B) Semi-conductor (C) Strong plastic (D) Aluminum

2. **Photocopier and inkjet printer are the applications of:** **(LHR 2016)**

   (A) Electrostatics (B) Magnetism (C) Electricity (D) Electro-magnetism

3. **If a charged body is moved against the electric field, it will again:** **(LHR 2016)**

   (A) P.E (B) K.E

   (C) Mechanical energy (D) Electrical potential energy

4. **Electric field intensity at a point is defined by the equation:** **(GRW 2006)(LHR 2019)**

   (A) $E = \frac{q}{F}$ (B) $E = \frac{F}{q}$ (C) $E = qF$ (D) $E = \frac{q^2}{F}$

5. **The expression of energy stored in a capacitor is given by:** **(GRW 2009)(LHR 2011)**

   (A) $E = CV^2$ (B) $E = \frac{1}{2}CV^2$ (C) $E = \frac{1}{2}C^2V$ (D) $E = \frac{1}{2}(CV)^2$

6. **A dielectric material is placed between plates of parallel plate capacitor. Its capacitance increase due to:** **(GRW 2011, 2019)**

   (A) Polarization (B) Rectification

   (C) Magnification (D) Increased electric field

7. **In the time constant of RC circuit, how much charge is stored, out of maximum charge q_o?** **(GRW 2011, 2019)**

   (A) 0.37 q_o (B) .51 q_o (C) 0.63 q_o (D) 0.90 q_o

8. **The SI unit of electric flux is:** **(GRW 2016)**

   (A) N mc^{-2} (B) Nm^2c^{-1} (C) N cm^{-2} (D) N mc^2

9. **The amount of energy equal to 1.6×10^{-19} J is called:** **(FSD 2009, 2019)**

   (A) One volt (B) One milli-volt

   (C) One electron volt (D) One mega electron volt

10. **If the separation between the plates of a capacitor is doubled then its capacitance become:** **(SGD 2016)**

    (A) Double (B) Half (C) One fourth (D) Three times

11. **One electron volt is equal to:** **(SGD 2016)**

    (A) 1.6×10^{-19} Joul (B) 1.6×10^{-19} coulomb (C) $1.6\times10^{-19}N$ (D) 1.6×10^{19} Joul

12. **When an area is held perpendicular to the field lines, then the magnitude of electric flux is:** **(RWP 2011, 2019)**

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(LHR 2008, 2009, 2018, 2019, GRW 2011, 2016, RWP 2010, FSD 2008, 2009, 2011) (SGD 2009, 2010, 2011, 2018, LHR 2004, 2006, 2009, 2014, 2016; GRW 2019, MRP 2004, 2005, 2006) (FSD 2005, 2007, 2010, MTN 2004, 2005, 2006, 2010, 2015) (DGK 2000, 2005, 2006, 2013, 2015, BWP 2015, AJK 2015, LHR 2021, MTN 2021, SGD 2021, FSD 2021)

Q.94 Define peak – value and peak to peak value in case of A.C. current or voltage?
(LHR 2019,MTN 2010, 2016, SGD 2010, RWP 2008)

Q.95 Define A.C & make its waveform? **(FSD 2018)**

Q.96 What is a choke?
(FSD2019; SGD 2019; RWP 2019; DGK 2019)

Q.97 A sinusoidal current is represented by equation $I = 20\sin 100\pi t$. Find frequency and rms value of current? **(DGK 2018)**

Q.98 Name the device that will (a) permit flow of direct current but oppose the flow of alternating current (b) permit flow of alternating current but not the direct current.
(LHR 2009, 2011; SWL 2019; RWP 2009, 2010, 2011, BWP 2009, DGK 2009, 2019) (SGD 2009, 2010, 2011, 2018, LHR 2014, DGK 2014, 2015, FSD 2004, 2018, MTN 2009, SWL 2021)

Q.99 A circuit contains an iron-cored inductor, a switch and a D.C. source arranged in series. The switch is closed and after an interval reopened. Explain why a spark jumps across the switch contacts?
(DGK 2019; GRW 2003, 2004, 2005, 2006, 2007, 2008)(LHR 2008, 2015, FSD 2004, 2019, MTN 2005, MP 2004, BWP 2008, FSD 2021)

Q.100 How does doubling the frequency affect the reactance of (a) an inductor (b) a capacitor?
(GRW 2006, 2009, 2016, 2019, MTN 2008, 2009, 2010, 2016, RWP 2005, 2009, 2014, 2015) (SWL 2014, LHR 2002, 2004, 2007, 2009, 2012, 2014, 2015, 2016)(DGK 2000, 2005, 2006, FSD 2005, 2014, 2016, 2018, MP 2009, 2012; BWP 2019, LHR 2021)

Q.101 What is the principle of generation EM waves?
(SWL 2019;SGD 2019)

Q.102 What is R-C series circuit? Calculate the impedance and phase angle of R-C series circuit.
(LHR 2012, FSD 2015, 2018, MTN 2015)

Q.103 In a R–L circuit, will the current lag or lead the voltage? Illustrate your answer by a vector diagram.
(LHR 2008, GRW 2014, DGK 2009, 2010, 2014, SGD 2016, RWP 2008)(LHR 2005, 2006, 2007, 2008, 2014, SGD 2003, 2004, GRW 2005, 2014, 2015) (FSD 2004, 2015, MTN 2015, DGK 2005, 2014, BWP 2004, 2014, 2015, AJK 2015)

Q.104 How many times per second will an incandescent lamp reaches maximum brilliance when connected to a 50 Hz source?
(LHR 2000, 2001, 2003, 2006, 2010, 2014, 2016, FSD 2003, BWP 2014, SWL 2014)(SGD 2005, 2019, MTN 2004, 2007, 2008, 2012, 2014, 2015, 2019, RWP 2006, 2009, 2013, 2015)(FSD 2005, 2006, 2007, 2008, 2010, 2011, 2013, 2014)(AJK 2015, MP 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2014)(GRW 2001, 2004, 2005, 2006, 2007, 2009, 2010, 2012, 2015, MTN 2018, SWL 2021)

Q.105 What is R-C series circuit? Calculate the impedance and phase angle of R-C series circuit.
(LHR 2012, FSD 2015, 2018, MTN 2015)

Q.106 In a R–L circuit, will the current lag or lead the voltage? Illustrate your answer by a vector diagram.
(LHR 2008, GRW 2014, DGK 2009, 2010, 2014, SGD 2016) (RWP 2008, LHR 2005, 2006, 2007, 2008, 2014, SGD 2003, 2004) (GRW 2005, 2014, 2015, FSD 2004, 2015, 2019)(MTN 2015, DGK 2005, 2014, BWP 2004, 2014, 2015, AJK 2015, MTN 2021, SGD 2021)

Q.107 Write the advantages and disadvantages of FM over AM.
(LHR 2019; FSD 2019; SGD 2019BWP 2019)

Q.108 What is R-C series circuit? Calculate the impedance and phase angle of R-C series circuit.
(LHR 2012)(FSD 2015, 2018)(MTN 2015)

Q.109 Describe the principle, construction, working and uses of the three phase A.C supply.
(LHR 2018)(SWL 2014, MTN 2021)

Q.110 Explain phase relationship between Voltage and current when an A.C source is connected across a capacitor. Also derive the relation for reactance of a capacitor?
(MTN 2014)

Q.111 What is meant by A.M. and F.M.?
(LHR 2001, 2005, 2007, 2008, 2011, 2012, 2013, 2014, 2016)(BWP 2003, 2006, 2007, 2010, 2012, 2013, 2016)(SGD 2001, 2005, 2006, 2009, 2010, 2011, 2014)(FSD 2005, 2006, 2009, 2010, 2012)(GRW 2005, 2006, 2007, 2008, 2009, 2013, 2015)(FSD 2000, 2001, 2004, 2007, 2009, 2011)(DGK 2018)

Q.112 How the reception of a particular radio station is selected

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(A) Negative (B) Maximum (C) Minimum (D) Zero

13. **The force on an electron in a field of 1 x 10^8 NC^{-1} will be:** **(MTN 2008)(FSD 2019)**
(A) 1.6 x 10^{-8}N (B) 1.6 x 10^{-11}N (C) 1.6 x 10^{-19}N (D) 1.6 x 10^{-27}N

14. **If the potential difference across the two plates of parallel plate capacitor is doubled, then the energy stored in it will be:** **(MTN 2009)**
(A) Two times (B) Eight times (C) Four times (D) Remains constant

15. **In R-C series circuit the correct relation for time constant:** **(MTN 2010,2018)**
(A) R.1 = C (B) C.t = R (C) R.C = t (D) C.V = Q

16. **If $\phi = \vec{E}.\vec{A}$ then maximum value of flux are obtained if angle between E and A is:** **(MTN 2010)**
(A) 90° (B) 180° (C) 270° (D) 0°

17. **If the distance between two point charges is doubled, the coulomb force between them will become:** **(MTN 2011)**
(A) Double (B) Half (C) Three times (D) One fourth

18. **The SI unit of constant 'K' in coulomb' s law is:** **(MTN 2011)**
(A) Nm^2C^{-2} (B) $C^2N^{-1}m^{-2}$ (C) $C^2N^{-2}m^{-2}$ (D) $Nm^{-2}C^{-2}$

19. **One Joule is equal to:** **(MTN 2016)**
(A) $1.6\times10^{-19}eV$ (B) $1.6\times10^{-10}eV$ (C) $6.25\times10^{+18}eV$ (D) $6.25\times10^{10}eV$

20. **Capacitance of parallel plate capacitor is:** **(GRW 2018) (MTN 2016)**
(A) $\frac{\varepsilon_o d}{A}$ (B) $\frac{\varepsilon_o A}{d}$ (C) $\frac{A}{\varepsilon_o d}$ (D) $\frac{d}{\varepsilon_o A}$

21. **The electric filed created by positive charge is:** **(MTN 2016)**
(A) Radially inward (B) Zero (C) Circular (D) Radially outward

22. **The unit of Electric intensity other than NC^{-1} is:** **(MTN 2016)**
(A) $\frac{V}{A}$ (B) $\frac{V}{m}$ (C) $\frac{V}{C}$ (D) $\frac{N}{V}$

23. **In photo copier, the drum is coated with a layer of:** **(SWL 2018) (DGK 2018)**
(A) Copper (B) Silver (C) Selenium (D) Gold

24. **If time constant in RC series is small, then the capacitor is charged:** **(DGK 2018, SWL 2018)**
(A) Slowly (B) Rapidly (C) At constant rate (D) Intermediately

25. **Intensity of hollow charge inside a hollow sphere will be:** **(SWL 2018)**
(A) Negative (B) unaffected (C) Zero (D) Maximum

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(BWP 2008, SWL 2014, 2019; GRW 2019; LHR 2001, 2005, 2007, 2008, 2011, 2015, 2016,2019 MTN 2005, 2015, 2018, 2019, FSD 2008,2014; MP 2006, 2007, 2008, 2009, GRW 2014, 2015, DGK 2014, 2015, RWP 2005) (BWP 2008)(SWL 2014)(LHR 2021)

Q.187 Is it possible to create a single electron from energy? Explain
(FSD 2000, 2001, 2007, 2010, 2012)(BWP 2005, 2009) (RWP 2014)(DGK 2015)(LHR 2000, 2002, 2005, 2008, 2010, 2011, 2013, 2016)(FSD 2019, 2021)

Q.188 What is the energy of photon in a beam of infra-red radiation of wavelength1240 nm? **(LHR 2019)**

Q.189 Can pair production take place in vacuum? Explain.
(BWP 2006, 2015, MTN 2014; SWL 2019) (DGK 2014, LHR 2014, 2015, 2016, 2019, GRW 2005, 2007, 2010, 2014, 2015, 2016, FSD 2021, SGD 2021)

Q.190 Calculate the value of Compton wavelength of electron? **(FSD 2019)**

Wave Nature of Particles

Q.191 If electrons behaved only like particles, what pattern would you expect on the screen after the electrons passes through the double slit?
(LHR 2001, 2002, 2005, 2007, 2010, GRW 2004, 2009, FSD 2003, 2008)

Q.192 A particle of mass 5 mg moves with the speed 8 ms^{-1}. Calculate the de Broglie's wavelength. **(MTN2019)**

Q.193 If an electron and a proton have the same de-Broglie wavelength, which particle has greater speed?
(LHR 2001, 2003, 2005, 2008, 2015) (GRW 2004) (FSD 2003, 2006, 2009, 2013, 2015) (DGK 2006, 2018)(BWP 2007, 2008) (SGD 2018, SWL 2021)

Q.194 We do not notice the de-Broglie wavelength for a pitched cricket ball. Explain why?
(RWP 2002, 2003, 2006, MTN 2005, 2008, FSD 2021)

Q.195 If the following particles have the same energy, which has the shortest wavelength? Electron, alpha particle, neutron, proton? **(LHR 2001, 2005, 2007, 2008, 2011)**

Q.196 When does light behave as a wave? When does it behave as a particle?
(MRP 2006, GRW 2005, 2009, 2015, BWP 2008, 2010, 2012) (LHR 2004, 2007, 2010, 2014, SGD 2005, MTN 2005, 2018, FSD 2005, 2019)

Q.197 What advantages an electron microscope has over an optical microscope?
(GRW 2003, 2004, 2005, 2006, 2007, 2008, 2009; FSD 2019)(MTN 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2015)(LHR 2005, 2006, 2009, 2013, DGK 2005, 2009, 2013, 2015, BWP 2000)(FED 2019)(LHR 2021)

Q.198 What is wave particle duality? Give its one practical use? **(LHR 2016)**

Heisenberg's Uncertainty Principle

Q.199 If measurements show a precise position for an electron, can those measurements show precise momentum also? Explain.
(LHR 2001, 2005, 2007, 2008, 2011; GRW 2019) (SGD 2003, MTN 2004, RWP 2005, BWP 2007)

Q.200 Write the name of any four applications of photo-cell. **(MTN 2021)**

Q.201 What is the energy of photon in a beam of infra-red radiations of wavelength 1240 nm? **(SGD 2021)**

Q.202 What is condition for pair production? **(SWL 2021)**

Q.203 Give two statements of uncertainty principle and writ their mathematical forms. **(SWL 2021)**

Q.204 Bohr's theory of hydrogen atom is based upon several assumptions. Do any of these assumptions contradict classical physics?
(DGK 2018, LHR 2002, 2019; BWP 2004)

Q.205 Can the electron in the ground state of hydrogen atom absorb a photon of energy 13.6 eV and greater than 13.6 eV?
(LHR 2006, 2007, 2008, 2019; MTN 2005, RWP 2015, MTN 2021)

Q.206 Write down two postulates of Bohr's theory. **(BWP 2019)**

Q.207 Is energy conserved when an atom emits a photon of light?
(DGK 2015)(MTN 2006, 2015, GRW 2008, 2012, 2015, FSD 2005, 2009, 2012, 2014, 2018)(MP 2009, 2011, LHR 2007, 2010S, 2015, RWP 2014, SWL 2014)(GRW 2009, LHR 2007, 2011, SGD 2009, RWP 2010, BWP 2008, SGD 2021)

Q.208 An electron cannot reside inside the Na (10^{-14} m) verify it by uncertainty principle.
(FED 2019)(DGK 2018)(MTN 2010)

Inner shell Transitions and Characteristic X-Rays

Q.209 Explain characteristic X-ray and continuous X-ray spectra?**(FSD 2011, 2012, GRW 2011, MTN 2018, 2021)**

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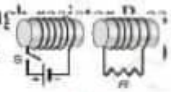
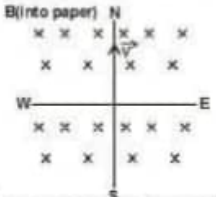
vertical bar magnet as shown in the figure. Viewed from above, does the current flow clockwise or anticlockwise in the ring?
(BWP 2006, 2007, 2008, MTN 2005)

Q.72 What is the direction of the current through resistor R as shown in the figure? As switch S is opened.

(MTN 2005, MP 2004, 2007, 2010, BWP 2006, 2007, 2008)

Q.73 In a certain region the earth's magnetic field points vertically down. When a plane flies due north, which wing tip is positively charged?
(LHR 2001, 2005, 2007, 2008, 2011, MTN 2005, BWP 2008, RWP 2005, FSD 2008)(MRP 2006, 2007, 2008, 2009, SWL 2021)



Q.74 A suspended magnet is oscillating freely in a horizontal plane. The oscillations are strongly damped when a metal plate is placed under the magnet. Explain why this occurs?
(MTN 2011)(SGD 2016, LHR 2010, FSD 2010, LHR 2000, 2003, 2004, 2008, 2012, 2013, 2014)
(FSD 2003, 2004, 2008, 2012, 2013, SGD 2006, 2008, 2012, 2013, MTN 2008, 2012, 2014, 2019)
(RWP 2006, 2008, 2012, 2013, MP 2003, 2005, 2006, 2008, 2009, GRW 2010)

Q.75 Does the induced emf in a circuit depend on the resistance of the circuit? Does the induced current depend on the resistance of the circuit?
(SGD 2016, FSD 2008, SGD 2009, 2010)(RWP 2009, MTN 2016, GRW 2009, 2010, LHR 2002, 2016, 2019; BWP 2004)

Q.76 What is motional emf write its mathematical relation.
(LHR 2019)

Q.77 How the induced current can be increased.
(LHR 2019)

Q.78 Show that ε and $\frac{\Delta\phi}{\Delta t}$ have the same units.
(LHR 2008, 2018, 2019; FSD 2009, 2019)
(RWP 2009, BWP 2002, 2003, 2007, 2011, 2012, AJK 2001, 2004, 2005, 2007, 2010, 2013)(DGK 2018; SGD 2010, 2011, 2016, FSD 2021)

Q.79 A metal rod of length 0.25 m is moving with speed of 0.5 ms^{-1} in the direction perpendicular to a 0.25 T magnetic field. Find the emf produced in the rod.
(DGK 2018, FSD 2011, GRW 2011, 2019)

Q.80 On which factors mutual inductance depends. Upon.
(FSD 2019, SGD 2021)

Q.81 Does the induced emf always act to decrease the magnetic flux through a circuit?
(MTN 2002, 2006, GRW 2008, SGD 2018, FSD 2005, FSD 2008, MP 2009) (LHR 2000, 2007, 2010, SGD 2021, SWL 2021)

Q.82 When the switch in the circuit is closed, a current is established in the coil and the metal ring jumps upward. Why? Describe what would happen to the ring if the battery polarity were reversed?

(DGK 2005, MTN 2009)

Q.83 State Lenz's law and write its formula. (GRW 2019)

Q.84 What is a back emf effect in generators?
(FSD 2019; MTN2019)

Q.85 Is it possible to change both the area of the loop and the magnetic field passing through the loop and still not have an induced emf in the loop?
(LHR 2002, 2004, 2007, 2009, 2012) (MTN 2009, DGK 2000, 2005, 2006, FSD 2005, MRP 2009)

Q.86 Define units of self-inductance?
(SGD 2018, LHR 2018, MTN 2011, BWP 2010, FSD 2011)

Q.87 How would you position a flat loop of wire in a changing magnetic field so that there is no emf induced in the loop?
(GRW 2016, 2019; LHR 2016, FSD 2005; MTN2019, MTN 2021, SGD 2021)

Q.88 Distinguish between A.C generator & Transformer?

Q.89 Name the factors upon which self-inductance depends?
(MTN 2021)

Q.90 Write down two methods for producing the induced emf in a coil. (MTN 2021)

Q.91 State Lenz's law and Faraday's law.
(MTN 2021, SWL 2021)

Q.92 Does the self-inductance depend upon the rate of change of current? (FSD 2021)

Q.93 A sinusoidal current has rms value of 10 A.What is the maximum or peak value?

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(BWP 2019)

Q.240 Describe the principle of operation of the solid state detector of ionizing radiation in terms of generation and detection of charge carriers.
(MTN 2011, SGD 2011, FSD 2021)

Q.241 Write down any two advantages of solid state detector over Geiger Muller counter. **(MTN 2011;LHR 2019)**

Q.242 Describe the advantages and disadvantages of nuclear power compared to the use of fossil fuel generated power?
(FSD 2021)

Nuclear Fission

Q.243 What do you mean by the term critical mass?
(LHR 2012, 2014, GRW 2012, 2019) (RWP 2011, 2019, DGK 2008, 2010, 2019; MTN 2010, 2012, SGD 2009, 2011; SWL 2019; BWP 2019)

Q.244 What is the function of moderator is nuclear reactor? Give its example?
(FSD 2018, SGD 2010, MTN 2013; SGD 2019)

Q.245 What factors make the fusion reaction difficult to achieve?
(LHR 2009, 2013, 2014, 2019) (GRW 2008, 2009, 2012, RWP 2009, 2019MTN 2009, 2010, 2011, 2012)(FSD 2008, 2011, SGD 2012, 2013; BWP 2019, LHR 2021)

Q.246 Explain briefly fission chain reaction. **(SGD 2019)**

Q.247 What is natural radioactivity? Name types of radiation emitted from radioactive elements. **(FSD 2019)**

Radiation Exposure

Q.248 Briefly describes the term radiography.
(RWP 2011; FSD 2019)

Q.249 What is the radioactive tracer? Describe one application each in medicine, agriculture and industry.
(GRW 2012, RWP 2010, FSD 2011, 2018, LHR 2018; SWL 2019)

Q.250 How can radioactivity help in the treatment of cancer?
(LHR 2014, 2018, 2019; GRW 2009, 2010, MTN 2009, 2010, 2018, 2019 FSD 2012, 2013, 2019, SGD 2019, RWP 2019)

Basic Force of Nature and Building Blocks of Matter

Q.251 Name the forces which are unified so far.
(FSD 2010, 2018, SGD 2018, BWP 2021)

Q.252 What is absorbed does. Define SI unit of absorbed does an equivalent does.
(SGD 2010, FSD 2008; MTN 2019, DGK 2019)

Q.253 Write the names of four basic forces of nature.
(MTN 2019)

Q.254 Differentiate between leptons and Hadrons.
(GRW 2014, RWP 2010, 2019FSD 2019, MTN 2021)

Q.255 Define hadron. Also differentiate between baryons and mesons. **(SGD 2019, LHR 2021)**

Q.256 Why are heavy nuclei are unstable? **(LHR 2021)**

EXTENSIVE QUESTIONS

Q.1 State and explain coulomb's law.
(BWP 2008, 2012, MTN2011, GRW 2007, SGD 2015)

Q.2 Define electric potential. Calculate electric potential due to point charge. **(GRW 2019)**

Q.3 State gauss's law and find electric intensity due to an infinite sheet of charge.
(BWP 2010, 2014, LHR 2010, 2014, 2015, 2019, LHR 2021)

Q.4 State gauss's law and find electric intensity between two oppositely charged parallel plates.

Q.5 Define capacitance. Also derive a relation for capacitance of a parallel plate capacitor for air and dielectric as a medium. **(SGD 2021)**

Q.6 Describe the experiment for determination of a charge on an electron by Millikan's oil drop method.
(SWL 2021; MTN 2008, 2012, RWP 2009, 2012, 2014; LHR 2019)

Q.7 Explain the term resistivity and its dependence upon temperature coefficient.
(MTN2010, 2013, RWP 2014, 2016)

Q.8 State and explain Ohm's law. **(BWP 2014, 2017)**

Q.9 What is Wheatstone bridge? How it can be used to find unknown resistance? **(FSD 2021)**

Q.10 Calculate the magnetic field due to current carrying solenoid by using Ampere's Law.
(GRW 2019; FSD 2019)

Q.11 Derive the relation for force on a moving charge in a magnetic field. **(LHR 2021)**

Q.12 Determine e/m of an electron. **(MTN 2019, SGD 2021)**

Q.13 Explain construction, working and uses of CRO.
(SWL 2021)

Q.14 Derive the expression for torque on current a carrying coil in a uniform magnetic field.
(LHR 2019, SWL 2019, FSD 2021)

Q.15 State the law Lenz's law?
(BWP 2013, 2015, DGK 2004, 2007, 2009, 2018)

Q.16 State and example faraday's law of induced emf.
(BWP 2005, 2004, SGD 2010, 2011, 2015, MTN2011, 2013)

Q.17 Drive the relation for motional emf.
(MTN2015, LHR 2013, SGD 2014)

Q.18 Explain Faraday's law of electromagnetic induction and explain the significance of negative sign using lens's

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(FSD 2019)

Q.137 **Write a note on superconductors.**
(GRW 2011)(BWP 2009)(MTN 2009)(DGK 2009) (LHR 2008, 2013)(GRW 2005)(BWP 2008, SWL 2021, FSD 2021)

Q.138 How would you obtain n-type and p-type material from pure silicon? Illustrate it by schematic diagram. **(MTN2019; SWL 2019)**

Q.139 Define unit cell and give the number of basic crystal systems? **(MTN 2016)(LHR 2010)**

Q.140 What do you mean by Curie temperature? Write Curie temperature for iron? **(LHR 2019, SGD 2021)**

Q.141 Why does doping not change the basic structure of solids? **(MTN 2021)**

Q.142 What is retentivity and coercive current? **(FSD 2021)**

Q.143 What is the biasing requirement of the junctions of a transistor for its normal operation? Explain how these requirements are met in a common emitter amplifier?
(LHR 2001, 2005, 2007, 2008, 2011, MTN 2005, BWP 2008, RWP 2005, FSD 2008) (SGD 2019 MP 2006, 2007, 2008, 2009)

Q.144 What is a transistor? How n-p-n transistor circuit is drawn in a common emitter configuration?
(SGD 2010, LHR 2008, GRW 2012, SWL 2013)

Q.145 Draw the circuit symbols for (a) npn, and (b) pnp transistor. **(LHR 2010, RWP 2009)**

Q.146 In a certain circuit, the transistor has a collector current of 20 mA and base current 60μA. What is the current gain of the transistor?
(BWP 2011, GRW 2019, SGD 2021)

Q.147 What do you mean by terms rectifier and rectification? **(SWL 2019)**

Q.148 Why the ordinary silicon diode does not emit light?
(MTN 2008, 2016)(DGK 2008, 2010, 2019)(RWP 2008, 2010)(FSD 2011)(LHR 2001, 2005, 2007, 2008, 2011, 2013, 2014, 2016, 2019)(DGK 2005, 2019) (MTN 2009, 2018)(AJK 2015)(FSD 2015 2019) (SGD 2018, MTN 2021)

Q.149 The anode of a diode is 0.2 V positive with respect to its cathode. Is it forward biased?
(DGK 2010, 2015)(SGD 2009)(LHR 2006, 2011, 2014) (GRW 2010) (2007, 2008) (MTN 2005) (RWP 2014)(SWL 2014)(AJK 2015) (GRW 2015) (FSD 2015, 2019) (SWL 2019; SGD 2019)

Q.150 Why the charge carrier is not present in the depletion region? **(FSD 2019, SGD 2021)**

Q.151 What is the net charge on n-type or p-type substances? **(DGK 2019; BWP 2019, MTN 2021)**

Q.152 What is solar cell? Give its uses. **(FSD 2019)**

Q.153 Why a photo diode is operated in reverse biased state? **(SWL 2019;RWP 2019, SGD 2021, SWL 2021)**

Q.154 Write four application of photodiode? **(SGD 2019;DGK 2019)**

Q.155 How does of electron in a n-type differ from motion of holes in p-type substance? **(MTN2019)**

Q.156 Define open loop gain of an operational amplifier and write its formula: **(LHR 2018, MTN 2018)**

Q.157 If R_1 = 10 KΩ and R_2 = 100 K Ω. Find the gain of inverting operational amplifier **(SGD 2010)**

Q.158 What is the principle of virtual ground? Apply it to find the gain of an inverting amplifier.
(SGD 2013, 2016, DGK 2014, 2015, FSD 2015, BWP 2014, GRW 2014) (LHR 2006, 2014, 2015, FSD 2005, 2006, SWL 2021)

Q.159 Write two characteristic of op-amp? **(MTN2019; SGD 2019; BWP 2019)**

Q.160 What is meant by rectification? **(FSD 2019) (LHR 2016, 2019)**

Q.161 What is potential barrier? What is the value of potential barrier of Si and Ge?

Q.162 Give the four applications of a photo diode? **(LHR 2008, 2010)**

Q.163 Why is the base current in a transistor very small?
(RWP 2009, 2010)(LHR 2013, 2014, 2015, 2016) (FSD 2005, 2015)(GRW 2008, 2011, 2014,2015) (RWP 2015) (DGK 2014)(MTN 2015)(SWL 2014, SWL 2021)

Q.164 Why a photodiode is operated in reverse biased state?
(DGK 2014)(BWP 2014)(GRW 2009)(RWP 2008, 2012) (FSD 2008, 2009)(MTN 2008, 2009, 2010, 2011) (LHR 2002, 2005, 2006, 2008, 2011, 2015, 2016, 2019) (GRW2009) (MTN 2015) (FED 2019)

Q.165 Why charge carriers are not present in the depletion region?
(GRW 2006, 2010, 2016)(SGD 2016) (LHR 2013, 2010) (MTN 2005, 2014) (GRW 2015) (MP 2004, 2007, 2010) (BWP 2006, 2007, 2008)(DGK 2015, 2018) (FSD 2014)

Q.166 What is the effect of forward and reverse-biasing of a diode on the width of depletion region?

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(a) The length of the solenoid is doubled but the number of turns remains the same and
(b) The number of turns is doubled, but the length remains the same.
(LHR 2002, 2003, 2005, 2006, 2009, MTN 2000, 2001, 2004, 2007, 2008, 2010)(GRW 2016, GRW 2006, DGK 2010, BWP 2008, MTN 2009)

Q.52 What is Solenoid? **(DGK 2018, GRW 2009)**

Q.53 At a given instant, a proton moves in the positive x-direction in a region where there is magnetic field in the negative z-direction. What is the direction of the magnetic force? Will the proton continue to move in the positive x-direction? Explain.
(RWP 2002, 2003, 2006, MTN 2005, 2008)

Q.54 If a charged particle moves in a straight line through some region of space, can you say that the magnetic field in the region is zero?
(GRW 2003, 2009, MTN 2004, 2009, BWP 2011) (DGK 2008, 2011, SGD 2011) (LHR 2005, 2006, DGK 2005, BWP 2000, LHR 2021)

Q.55 Two charged particles are projected into a region where there is a magnetic field perpendicular to their velocities. If the charges are deflected in opposite directions, what can you say about them?
(LHR 2004, 2018, SGD 2005, MTN 2005, FSD 2005, MP 2006) (GRW 2005, 2009, 2013, 2015, BWP 2008, LHR 2021)

Q.56 Suppose that a charge q is moving in a uniform magnetic field with a velocity v. Why is there no work done by the magnetic force that acts on the charge?
(GRW 2010, SGD 2011)(LHR 2002, 2003, 2005, 2006, 2009, MTN 2000, 2001, 2004, 2007, 2008, 2010)

Q.57 What is Lorentz force? Write its Mathematical formula.
(LHR 2019, SWL 2019)

Q.58 Why does the picture on a TV screen become distorted when a magnet is brought near the screen?
(FSD 2018; SGD 2003; MTN 2004, 2019) (RWP 2005; 2019; BWP 2007; GRW 2019; SWL 2019)

Q.59 How can you use a magnetic field to separate isotopes of chemical element?
(AJK 2015; LHR 2019)(LHR 2001, 2002, 2005, 2007, 2010, 2013, 2014, 2015, 2016, GRW 2004, 2009, 2012, 2015)(SGD 2016, MTN 2009, 2016, FSD 2003, 2008, 2013, 2014, 2015, 2019; DGK 2015, 2018)

Q.60 What are the uses of CRO?
(LHR 2008, 2014, 2016, 2018, 2019; DGK 2018, GRW 2011, MTN 2014, 2016, FSD 2011)

Q.61 What is the function of grid in cathode ray oscilloscope?
(SGD 2018, MTN 2016, GRW 2016, BRW 2009; GRW 2019; FSD 2019, DGK 2021)

Q.62 Name six essential parts of a CRO?
(LHR 2018, MTN 2008, MTN 2021)

Q.63 Is it possible to orient a current loop in a uniform magnetic field such that the loop will not tend to rotate? Explain.
(FSD 2010, LHR 2010, 2016, FSD 2010, 2016, DGK 2009, 2010, 2011)(MTN 2010) (GRW 2005, BWP 2006)

Q.64 How can a current loop be used to determine the presence of a magnetic field in a given region of space?
(DGK 2009, 2010, 2018, FSD 2018)(LHR 2000, 2001, 2007, 2010, 2012, 2014, 2016; MTN 2019) (BWP 2005, 2009, 2013, 2015, 2000, 2001, 2007, 2010, 2012, 2016)

Q.65 A loop of wire is suspended between the poles of a magnet with its plane parallel to the pole faces. What happens if a direct current is put through the coil? What happens if an alternating current is used instead?
(LHR 2002, 2004, 2007, 2009, 2012, 2016, MTN 2009, 2011)(DGK 2000, 2005, 2006, 2012, FSD 2005, 2012, MP 2009)

Q.66 What should be the orientation of a current carrying coil in a magnetic field so that torque acting upon the coils is (a) maximum (b) minimum?
(LHR 2001, 2005, 2007, 2008, 2011, BWP 2007, SGD 2005, FSD 2005, 2006, GRW 2005, 2006, 2007, 2008, 2009)

Q.67 How can you prefer the potentiometer over volt meter?
(GRW 2019)

Q.68 How does the graph pattern appear stationary on CRO screen?
(LHR 2021)

Q.69 Explain the principle of extension of right hand rule?
(LHR 2021)

Q.70 A square loop of wire is moving through a uniform magnetic field. The normal to the loop is oriented parallel to the magnetic field. Is a emf induced in the loop? Give a reason for your answer.
(GRW 2003, 2004, 2005)(MTN 2011, LHR 2000, 2001, 2005, 2008, RWP 2002, 2003, 2006, 2009)

Q.71 A light metallic ring is released from above into a

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potential.
(LHR 2002, 2003, 2005, 2006, 2009, 2018)(MTN 2000, 2001, 2004, 2007, 2008, 2010) (SGD 2018)

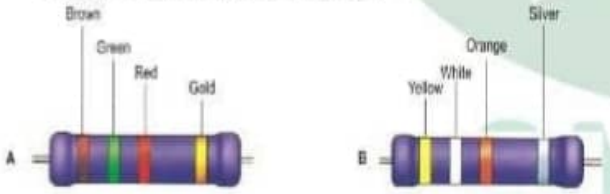
Q.30 What is meant by tolerance in a resistor? Right the value of tolerance of silver and gold. **(FSD 2019)**

Q.31 Do bends in a wire affect its electrical resistance? Explain.
(LHR 2002, 2005, 2006, 2008, 2009, 2010, 2013, 2014, 2015, 2016)(BWP 2003, 2007, 2009, 2010, 2014, 2016, MP 2005, 2007, 2008, 2010, 2013, 2016)(FSD 2008, 2013, 2015, 2016, SWL 2011, 2014, 2016)(GRW 2005, 2006, 2008, 2011, 2015, 2019; RWP 2002, 2003, 2005, 2009, 2010, 2015) (SGD 2001, 2003, 2004, 2007, 2009, 2011, 2014, 2018)(DGK 2000, 2003, 2006, 2007, 2009, 2010, 2012, 2014, 2018)

Q.32 Why does the resistance of a conductor rise with temperature?
(LHR 2002, 2003, 2005, 2006, 2009, 2010, 2012, 2013, 2014, 2016)(MTN 2000, 2001, 2004, 2007, 2008, 2010, 2014, 2015, 2019) (SGD 2003, 2006, 2007, 2009, 2011)(RWP 2002, 2003, 2005, 2009, 2011, 2016) (DGK 2000, 2003, 2006, 2007, 2009, 2010, 2012, 2014)

Q.33 Give two substances having negative temperature co-efficient. **(GRW 2016)**

Q.34 What are the resistances of the resistors given in the figures A and B? What is the tolerance of each? Explain what is meant by the tolerance?



(FSD 2003, 2005, 2018)(LHR 2005, 2002, 2010) (SGD 2005)(GRW 2003, 2005)(FSD 2005, 2008) (MP 2009, 2011, 2015)

Q.35 How many electrons passed through and electric bulb in one minute. If 300 mA current is passing through. **(SWL 2019)**

Q.36 Define resistance and resistivity also explain its dependence upon temeprature.
(FSD 2018, SGD 2014, 2016, GRW 2013, LHR 2008, 2011, MTN 2016, LHR 2021)

Q.37 What is Wheatstone bridge? How can it be used to determine an unknown resistance?
(LHR 2004, 20072008, 2010, 2012)(DGK 2009) (BWP 2009)(SGD 2010, 2011)(FSD2010, LHR 2021, FSD 2021)

Q.38 What is Wheatstone bridge, draw its circuit diagram. **(GRW 2019; SGD 2019, LHR 2021)**

Q.39 What is temperature co-efficient of resistance and resistivity? Derive the equations.
(LHR 2018, GRW 2013, FDR 2013, DGK 2015)

Q.40 State the Kirchhoff's 1st and 2nd rule.
(GRW 2007)(MTN 2016)(RWP 2009)(FSD 2015) (BWP 2010, 2014) (FSD 2019; MTN2019)

Q.41 Give two uses of potentiometer. **(LHR2009, MTN 2021)**

Q.42 Why resistance of a conductor inversely proportional to the area of cross-section of conductor? **(FSD 2010, LHR 2019, MTN 2021)**

Q.43 What is meant by the term 'Tolerance'? Explain. **(GRW 2011)(FSD 2009)(SGD 2009)(MTN 2016)**

Q.44 Explain why the terminal potential difference of a battery decreases when current drawn from it is increased? **(LHR 2021, SGD 2021)**

Q.45 A current in a conductor produces a magnetic field, which can be calculated using Ampere's law. Since current is defined as the rate of flow of charge, what can you conclude about the magnetic field due to stationary charges? What about moving charges?
(MTN 2006, 2009, LHR 2006, FSD 2006, DGK 2006, BWP 2007, 2008)

Q.46 A plane conducting loop is located in a uniform magnetic field that is directed along the x-axis. For what orientation of the loop is the flux a maximum? For what orientation is the flux a minimum?
(LHR 2001, 2003, 2005, 2008, GRW 2004, FSD 2003; GRW 2019)

Q.47 What is the effect of current passing through long straight wire? **(RWP 2019)**

Q.48 Define magnetic induction and tesla. **(SGD 2019)**

Q.49 Define magnetic flux and flux density?
(DGK 2018, FSD 2008, GRW 2011; MTN2019; SGD 2019)

Q.50 State Ampere law and write its mathematical formula. **(LHR 2018; SWL 2019)**

Q.51 Describe the change in the magnetic field inside a solenoid carrying a steady current I, if

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(A) Electrons (B) Protons (C) Neutrons (D) All of these

39. An ideal current source should have resistance : (SWL 2018)

(A) Zero (B) Finite but not zero

(C) Infinite (D) Depends on requirement

40. Three resistance each of 4 Ω are connected to form a triangle, the resistance between two terminal is: (SWL 2018)

(A) **4 Ω** (B) **12 Ω** (C) **8/3 Ω** (D) **3/8 Ω**

41. A charged particle moving in magnetic field experiences a magnetic force given by: (MTN 2019)(GRW 2006)(LHR 2007)

(A) $\vec{F}_m = q(\vec{V} \times \vec{B})$ (B) $F_m = qV\,B$ (C) $\vec{F}_m = (\vec{V} \times \vec{B})/q$ (D) $\vec{F}_m = (\vec{V} \cdot \vec{B})q$

42. The mathematical expression $\sum_{i=1}^{n}(\vec{B}.\Delta\vec{\ell})_i = \mu_o I$ is known as: (FSD 2010, 2019) (LHR 2010)

(A) Lenz's law (B) Ampere's law (C) Gauss's law (D) Faraday's law

43. One tesla is equal to: (LHR 2009, 2011)

(A) 1 $NA^{-1}m$, (B) 1 NA^{-1} (C) 1 Nm^{-1} (D) 1 $NA^{-1}m^{-1}$

44. The sensitivity of galvanometer can be increased by: (LHR 2016)

(A) Decreasing the area of coil (B) Decreasing the number of turns of coil

(C) Increasing the magnetic field (D) Using a fine suspension

45. The magnetic force is simply a: (LHR 2016)

(A) Reflecting force (B) Deflecting force

(C) Restoring force (D) Gravitational force

46. The brightness of spot in CRO is controlled by: (MTN 2019) (GRW 2016)

(A) Anode (B) Cathode (C) Deflecting Plates (D) Grid

47. The value of ε_0 permittivity for free space is: (GRW 2016, 2019) (LHR 2019)

(A) $8.85\times10^{-12}C^2N^{-1}m^{-2}$ (B) $8.85\times10^{-12}Nm^2C^{-2}$

(C) $8.85\times10^{-12}NmC^{-2}$ (D) $8.85\times10^{-12}m^2N^{-1}C^2$

48. Right hand palm rule is used to find the direction of: (LHR 2019)(FSD 2008)

(A) Current (B) EMF (C) Force (D) Temperature

49. The magnetic induction in a solenoid is: (FSD 2008)

(A) $B = \mu_o nl$ (C) $B = \mu_o Nl$ (C) $B = \mu_o Nl^2$ (D) $B = \mu_o nl^2$

50. Brightness of screen of CRO controlled by: (SGD 2016)

(A) Anode (B) Filament (C) Cathode (D) Grid

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94. **In RLC series circuit, the true condition for resonance takes place when: (FSD 2009, 2019) (LHR 2018)**
(A) $X_L = X_C$ (B) $X_L > X_C$ (C) $X_L < X_C$ (D) None of these

95. **S.I. unit of impedance is: (FSD 2010) (RWP 2008, 2011)**
(A) Henry (B) Hertz (C) Ampere (D) Ohm

96. **The inductive reactance is: (LHR 2019) (GRW 2018) (SGD 2009)**
(A) $X_L = \omega C$ (B) $X_L = \omega L$ (C) $X_L = \frac{1}{\omega C}$ (D) $X_L = \frac{1}{\omega L}$

97. **The reactance of capacitor is equal to: (SGD 2016)**
(A) ωc (B) $\frac{\omega}{c}$ (C) $\frac{c}{\omega}$ (D) $\frac{1}{\omega c}$

98. **The phase difference between current and voltage in an inductive circuit is: (SGD 2016)(GWR 2019)**
(A) Zero (B) 90° (C) 180° (D) 45°

99. **The average value of AC over one period with peak value V_o is: (GRW 2018) (DGK 2009)**
(A) $\frac{V_o}{\sqrt{2}}$ (B) V_o (C) $\sqrt{2}V_o$ (D) Zero

100. **The amplitude modulated transmission frequencies range from: (MTN 2008, 2019)**
(A) 540 HZ to 1600 HZ (B) 540 KHZ to 1600 KHZ
(C) 540 MHZ to 1600 MHZ (D) 88 MHZ to 108 MHZ

101. **Resistance of choke is: (FSD 2019)(MTN 2010)**
(A) Zero (B) Very small (C) Large (D) infinite

102. **At resonance frequency, the impedance of RLC – Parallel circuit is: (MTN 2016)**
(A) Zero (B) Infinite (C) Minimum (D) Maximum

103. **In R-L-C circuit, the energy is dissipated in: (MTN 2016)**
(A) R only (B) R and L (C) R and C (D) R, L and C

104. **High frequency radio wave is called as: (MTN 2016)**
(A) Fluctuative wave (B) Carrier wave (C) Matter wave (D) Mechanical wave

105. **The impedance $\mathbb{Z}$ can be expressed as: (MTN 2016)**
(A) $\mathbb{Z} = \frac{V_{rms}}{I_{rms}}$ (B) $\mathbb{Z} = \frac{I_{rms}}{V_{rms}}$ (C) $\mathbb{Z} = I + V$ (D) $Z = I - V$

106. **In three phase A.C. supply , the voltage across any two live lines is about (MTN 2018)**
(A) 220 V (B) 230 V (C) 300 V (D) 400 V

107. **The sum of positive and negative peak values is usually written as: (MTN 2018)**
(A) P – P values (B) P – N values (C) rms values (D) Cycle values

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51. **Torque is produced in a current carrying coil when it is placed in a:** **(SGD 2016)**
(A) Magnetic field (B) Electric field (C) Gravitational field (D) Nuclear filed

52. **The unit of magnetic flux is:** **(GRW 2018) (RWP 2008)**
(A) Weber (B) Henry (C) Weber–m^2 (D) None of these

53. **The Galvanometer constant in a moving coil galvanometer is given by:** **(RWP 2010)**
(A) $K=\frac{NB}{CA}$ (B $K=\frac{C}{NAB}$ (C) $K=\frac{NAB}{C}$ (D) $K=\frac{C}{NB}$

54. **The magnitude of force on a moving charge is zero then angle between the velocity of the charge carrier and magnetic field is:** **(FSD 2019) (BWP 2008)**
(A) 0° (B) 45° (C) 90° (D) 120°

55. **The unit of $\vec{E}$ is NC^{-1} and that of $\vec{B}$ is $NA^{-1}m^{-1}$ the unit of $\frac{\vec{E}}{\vec{B}}$ is:** **(LHR 2019) (MTN 2011)**
(A) ms^{-2} (B) ms (C) ms^{-1} (D) $m^{-1}s^{-1}$

56. **An electron enters the magnetic field at right angle from left, $\vec{B}$ is into paper. The electron will be deflected:** **(MTN 2016)**
(A) Upward (B) Towards right (C) Downward (D) Towards left

57. **_____ is correct relation:** **(MTN 2016)**
(A) $IT=10^4G$ (B) $IT=10^{-4}G$ (C) $IT=10^{-2}G$ (D) $IT=10^2G$

58. **The SI unit of magnetic induction is:** **(MTN 2016)**
(A) Water (B) Tesla (C) Gauss (D) Newton

59. **The value of $\frac{e}{m}$ is smallest for:** **(LHR 2019) (MTN 2016)**
(A) Proton (B) Electron (C) β – particle (D) Position

60. **CRO works by deflecting beam of:** **(MTN 2018) (DGK 2018)**
(A) Proton (B) Electron (C) Neutron (D) Position

61. **A positive charge moving towards an observer. The direction of magnetic induction will be:** **(MTN 2018)**
(A) Towards right (B) Clockwise (C) Anti-Clock Wise (D) Towards left

62. **In CRO, it controls the brightness of spot formed on the screen** **(MTN 2018)**
(A) Anode (B) Grid (C) Cathode (D) All of these

63. **When a charged particle moves at right angle to a magnetic field, which of the following quantities changes?** **(SWL 2018)**
(A) Momentum (B) Power (C) Speed (D) Energy

64. **When ohm meter gives full scale deflection, it indicates** **(GRW 2019)**

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78. **Lenz's law is actually the law of conservation of: (LHR 2019)(DGK 2009)**
(A) Mass (B) Charge (C) Energy (D) Momentum

79. **The self-inductance of solenoid is: (MTN 2016)**
(A) $L = \mu nA\ell$ (B) $L = \mu N^2 A\ell$ (C) $L = \mu n^2 A\ell$ (D) $L = \mu NA\ell$

80. **Lenz's law is in accordance with the Law of conservation of: (MTN 2016)**
(A) Momentum (B) Energy (C) Charge (D) Angular momentum

81. **When motor is just started, back emf is almost: (MTN 2016)**
(A) Maximum (B) Zero (C) Minimum (D) Infinite

82. **Henry is SI Unit of: (MTN 2016)**
(A) Current (B) Resistance (C) Flux (D) Self induction

83. **In step down transformer: (LHR 2018)**
(A) $N_p > N_s$ (B) $N_p < N_s$ (C) $N_p = N_s$ (D) None of these

84. **A 50 m H coil carries a current of 2 A. Then energy stored in a magnetic field is (MTN 2018)**
(A) 0.1 J (B) 10 J (C) 100 J (D) 1000 J

85. **In Non-ideal step-up transformer which quantity is remain unchanged: (SWL 2018)**
(A) Power (B) Frequency (C) Current (D) Voltage

86. **The mutual inductance of coil depends upon: (MTN 2018) (DGK 2018)**
(A) Density of coil (B) Material of coil (C) Geometry of coil (D) Stiffens of coil

87. **Self-inductance of a coil depends upon: (MTN 2018)**
(A) Number of turns of the coil (B) Area of cross-section of the coil
(C) The core material (D) All of the above

88. **In step down transformer: (LHR 2018)**
(A) $N_p > N_s$ (B) $N_p < N_s$ (C) $N_p = N_s$ (D) None of these

89. **The rms value of e.m.f. in a circuit is given by a factor of: (LHR 2006)**
(A) 1.11 (B) 0.707 (C) 0.007 (D) 0.637

90. **In case of capacitor, the unit of reactance is: (LHR 2016)**
(A) Ohm (B) Mho (C) Farad (D) Henry

91. **The phase angle between the voltage and current through resistor is: (LHR 2016)**
(A) 0° (B) 45° (C) 180° (D) 270°

92. **The frequency of alternating current is: (GRW 2006)**
(A) $f = \sqrt{\frac{I}{T}}$ (B) $f = T$ (C) $f = \frac{1}{T}$ (D) $f = \frac{I}{T^2}$

93. **The sum of positive and negative peak values is called: (GRW 2016)**
(A) Average value (B) r m s value (C) Peak value (D) P – P value

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law.

Q.19 Define mutual inductance. Explain the phenomena of mutual induction.

Q.20 Explain energy stored in an inductor. Drive the relation for energy density. (MTN 2021)

Q.21 Describe by Phasors diagram how A.C. passes through an R-C series circuit? **(LHR 2019, MTN 2021)**

Q.22 Draw a stress strain curve for a ductile material, and then define the terms: Elastic limit, Yield point and Ultimate tensile stress?
(MRP 2009, MTN 2018; LHR 2019) (LHR 2008, GRW 2009, SGD 2011, LHR 2007, 2008, RWP 2008, GRW 2009)

Q.23 Describe the formation of energy bands in solids. Explain the difference among electrical behavior of conductors, insulators and semi-conductors in terms of energy band theory.
(DGK 2010, BWP 2011, FSD 2010, MTN 2015, GRW 2013, 2010)(SGD 2009, 2010, 2015, SWL 2021)

Q.24 Distinguish between intrinsic and extrinsic semiconductors. How would you obtain n-type and p-type material from pure silicon? Illustrate it by schematic diagram.
(LHR 2015, 2016, 2019, GRW 2006, FSD 2011, 2018, RWP 2009, DGK 2009, 2018) (BWP 2010, 2011, MTN 2016, 2018, GRW 2013, 2019, SGD 2018, MTN 2021)

Q.25 What is meant by hysteresis loss? How is it used in the construction of a transformer?
(LHR 2000, 2001, 2003, 2007, 2010, 2016, GRW 2002, 2005; 2019)(FSD 2005, 2013, FSD 2003, DGK 2005, SGD 2021)

Q.26 Define rectification. Explain the full wave rectification.

Q.27 Explain transistor as an amplifier and derive a relation for its gain. **(SWL 2021)**

Q.28 What is an operational amplifier? Derive the relation for gain of an amplifier as an inverting amplifier.
(SGD 2021)

Q.29 Explain the OP-AMP as Non-inverting amplifier.
(FSD 2021)

Q.30 Explain photoelectric effect in detail. **(MTN 2021)**

Q.31 What is the de-Broglie hypothesis? How the Davisson Germer proves it experimentally.
(FSD 2021, SGD 2021)

Q.32 Give the postulates of Bohr's model of hydrogen atom. Also give de-Broglie's interpretation of Bohr's orbits.
(LHR 2018; GRW 2019 FSD 2015, DGK 2015, SGD 2016)

Q.33 From the second postulate of Bohr's model drive the relation for quantized radii.
(LHR 2019, FSD 2019; MTN 2019; SWL 2019, LHR 2021)

Q.34 Form the Bohr's model drive the relation for the quantized energies an also explain hydrogen emission spectrum.

Q.35 Explain in detail inner shell transitions and characteristic x-rays. **(LHR 2019, SWL 2021)**

Q.36 What are isotopes? How isotopes are separated by mass spectrograph also derive its relation. **(DGK 2019)**

Q.37 Define radioactivity. Explain the emission of alpha, beta and gamma particle from the radioactive element.
(FSD 2019)

Q.38 Describe the principle, construction and working of Wilson's cloud chamber. How it provide information about charged particle? **(RWP 2019, FSD 2021)**

Q.39 Explain the principle, construction and working of Geiger Muller counter.
(GRW 2019; BWP 2019, LHR 2021)

Q.40 What is fusion reaction? Explain in detail what is P-P cycle?

Q.41 Describe building blocks of matter. Explain subatomic particles in detail. **(MTN 2019)**

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(A) Zero resistance (B) Infinite resistance
(C) Small resistance (D) Very high resistance

65. The principle of an alternating current generator is based on: (MTN 2019)(LHR 2010)

(A) Coulomb's law (B) Ampere's law (C) Faraday's law (D) Lenz's law

66. The energy density of an inductor is: (LHR 2011)

(A) $\frac{B^2}{2\mu_0^2}$ (B) $\frac{\mu_o}{2B}$ (C) $\frac{\mu_o}{2B^2}$ (D) $\frac{B^2}{2\mu_o}$

67. When the back emf in a circuit is zero, it draws: (LHR 2016)

(A) Zero current (B) Maximum current (C) Minimum current (D) Average current

68. An inductor may store energy in: (MLN 2019) (LHR 2016)

(A) Its magnetic field (B) Its electric field (C) Its coil (D) A neighboring circuit

69. Energy stores in an inductor is given by: (GRW 2016, 2019)

(A) $\frac{1}{2}LI$ (B) $\frac{1}{2}L^2I$ (C) $\frac{1}{2}LI^2$ (D) $\frac{1}{2}L^2I^2$

70. If the motor is overloaded then magnitude of back emf: (GRW 2016)

(A) Increases (B) Decreases (C) Zero (D) Remains constant

71. One Henry is:(LHR 2019) (FSD 2008)

(A) VsA^{-1} (B) VsA^2 (C) V^2sA^{-1} (D) V^2sA^{-1}

72. Maximum value of induced emf in the coil of A.C. generator is: (FSD 2009) (LHR 2019)

(A) $\frac{NBA}{\omega}$ (B) $N\omega BA$ (C) $\frac{NB\omega}{A}$ (D) $\frac{NA\omega}{B}$

73. Eddy currents is one cause of energy loss in: (SGD 2016)

(A) A.C generator (B) Transformer (C) D.C motor (D) D.C generator

74. Unit of self-inductance is: (SGD 2016)

(A) Weber (B) Tesla (C) Henry (D) Farad

75. One Henry is equal to: (FSD 2019)(RWP 2009)

(A) 1 Ohm × 1 sec (B) 1 V A S (C) 1 VA^{-1} S (D) None of these

76. A 50 mH coil carries a current of 2 ampere. The energy stored in its magnetic field: (BWP 2009) (MTN 2018) (DGK 2018)

(A) 0.05J (B) 0.1J (C) 10J (D) 100J

77. The application of mutual induction is a: (FSD 2019)(BWP 2010)

(A) D.C. motor (B) Transformer (C) Radio (D) Television

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138. **The Boolean expression of NAND Gate is:** **(MTN 2016)**

(A) $X = A, B$ (B) $X = \bar{A}$ (C) $X = \overline{A, B}$ (D) $X = A + B$

139. **The input resistance of op-amp is** **(SWL 2018)**

(A) Zero (B) Very low (C) Very high (D) Infinity

140. **Photodiodes can be used:** **(MTN 2018)**

(A) For detecting of light
(B) Automating switching
(C) Logic circuits and optical communication devices
(D) All of these

141. **Which of the following is the most important building block of any complex electronic circuit?** **(MTN 2018)**

(A) Amplifier (B) Diode (C) Inductor (D) Oscillator

142. **In a comparator when intensity of light decreases, then resistance of LDR** **(FSD 2019)**

(A) R_L increases (B) R_L decreases (C) V_L increases (D) V_L increases

143. **The momentum of the moving photon is:** **(LHR 2016)**

(A) Zero (B) $h\lambda$ (C) $\frac{\lambda}{h}$ (D) $\frac{h}{\lambda}$

144. **Wave nature of light appears in:** **(GRW 2016) (DGK 2018)**

(A) Pair production (B) Compton effect (C) Photoelectric effect (D) Interference

145. **The platinum wire becomes white at a temperature of:** **(RWP 2018) (GRW 2016)**

(A) 1600°C (B) 1100°C (C) 1000°C (D) 600°C

146. **The rest mass of photon is:** **(FSD 2009) (MTN 2018) (DGK 2018)**

(A) m_o (B) $m_o c^2$ (C) Infinity (D) Zero

147. **Compton effect proves:** **(SGD 2016) (MTN 2018)**

(A) Wave nature of radiation (B) Wave nature of particle
(C) Dual nature of particle (D) Particle nature of radiations

148. **Mass of photon is equal to:** **(SGD 2016)**

(A) Mass of electron (B) Zero (C) Mass of proton (D) Mass of neutron

149. **The platinum wire becomes white at a temperature of:** **(RWP 2008) (SWL 2018)**

(A) 500°C (B) 1600°C (C) 1100°C (D) 900°C

150. **The minimum energy required by a photon to create an electron and positron pair is:** **(LHR 2019) (RWP 2011)**

(A) 3 Mev (B) 2.4 Mev (C) 15. Mev (D) 1.02 Mev

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151. **The angle of scattering for which Compton shift is maximum is: (D.G.K 2008 + MTN 2009)**

(A) 90° (B) 180° (C) 360° (D) 45°

152. **Radiations with wavelength shorter than violet are called: (DGK 2010) (MTN 2018)**

(A) X-rays (B) Infrared rays (C) Ultraviolet rays (D) γ-rays

153. **Platinum wire becomes yellow at temperature of: (DGK 2011)(MTN 2009)**

(A) 500°C (B) 900°C (C) 1100°C (D) 1300°C

154. **In Stephen-Boltzmann law ($E = \delta T^4$), the δ is called: (LHR 2019)(MTN 2010)**

(A) Plank's constant (B) Stephen-Boltzmann constant
(C) Stephen's constant (D) Boltzmann constant

155. **The factor $\frac{h}{m_o c}$ in Compton's equation has the dimension of: (LHR 2019)(MTN 2011)(LHR 2018)**

(A) Pressure (B) Length (C) Mass (D) Momentum

156. **_____ has the largest de Broglie Wavelength at same speed: (MTN 2016)**

(A) Proton (B) α – particle (C) Carbon Atom (D) Electron

157. **Two photons approach each other, their relative speed will be: (MTN 2016)**

(A) 2 C (B) Zero (C) Less than C (D) C

158. **The dimensions of Planck's constant is same as that of: (MTN 2016)**

(A) Energy (B) Power (C) Acceleration (D) Angular Momentum

159. **The photon with energy greater than 1.02 MeV can interact with matter as: (MTN 2016)**

(A) Photoelectric effect (B) Compton Effect
(C) Pair production (D) Annihilation of Matter

160. **Compton shift is maximum for scattering angle θ = (SWL 2018)**

(A) 0° (B) 45° (C) 90° (D) 180°

161. **If the energy of photon is 10 eV and work function is 5 eV, then the a value of stopping potential will be (LHR 2018)**

(A) 50 V (B) 2 V (C) 5 V (D) 15 V

162. **If velocity of a body become equal to "C", then its mass becomes (FSD 2019)**

(A) 0 kg (B) $m = m_o$ (C) $m = \infty$ (D) $m = m_o/2$

163. **If the temperature is double of black body, then energy radiated per second unit area then (MTN 2019)**

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108. **In case of capacitor, the unit of its reactance is: (SWL 2018)**
(A) Farad (B) Ohm (C) mho (D) Henry

109. **Basic circuit element in a D.C. circuit which controls the current and voltage is: (SWL 2018)**
(A) Capacitor (B) Resistor (C) Inductor (D) Transistor

110. **The phase at the positive peak of A.C. is (MTN 2018)**
(A) $\pi/2$ (B) $\pi/4$ (C) π (D) $3\pi/2$

111. **The impedance of RL series circuit is (LHR 2019)**
(A) $Z = \sqrt{R^2 + X^2_C}$ (B) $Z = \sqrt{R^2 + X^2_L}$ (C) $Z = \sqrt{R + X_L}$ (D) Z = R

112. **Capacitance required to construct a resonance circuit of frequency 1000 kHz with inductor 5 mH is (LHR 2019)**
(A) $5.09\,\mu F$ (B) 5.09 pF (C) 5.09 mF (D) 50.9 pF

113. **Velocity of oscillation charges as it move to and fro along wire is (LHR 2019)**
(A) Infinite (B) Constant (C) Changing (D) Zero

114. **At what frequency will on inductor 1 H have reactance 500 Ω (LHR 2019)**
(A) 40 Hz (B) 60 Hz (C) 70 Hz (D) 80 Hz

115. **In a capacitive circuit of AC quantity, when q = 0. The slop of q – t curve is (GRW 2019)**
(A) Minimum (B) Maximum (C) Zero (D) Negative

116. **Which type of impurity is to be added to a pure semi-conductor crystal to provide holes: (LHR 2016)**
(A) Monovalent (B) Trivalent (C) Tetravalent (D) Pentavalent

117. **The Curie temperature for iron is: (GRW 2016,2018)**
(A) 750°C (B) 650°C (C) 550°C (D) 850°C

118. **The conductivity of metals is of the order of: (LHR 2019)(FSD 2008)(SGD 2010) (MTN 2018)**
(A) $10^1\ (\Omega m)^{-1}$ (B) $10^{10}\ (\Omega m)^{-1}$ (C) $10^7 (\Omega m)^{-1}$ (D) $10^{15} (\Omega m)^{-1}$

119. **The critical temperature (T_c) of lead is: (SGD 2016)**
(A) 7.2 k (B) 3.72 k (C) 125 k (D) 77 5

120. **Domains contain atoms: (FSD 2019) (GRW 2018) (MTN 2011,2018) (DGK 2018)**
(A) 10^3 to 10^6 (B) 10^6 to 10^9 (C) 10^9 to 10^{12} (D) 10^{12} to 10^{16}

121. **To get N – type, the Ge is doped with: (MTN 2016)**
(A) Aluminium (B) Arsenic (C) Boron (D) Indium

122. **Substances which break just after the elastic limit is reached are called as: (MTN 2016)**

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175. **If electron jump from second orbit to first orbit in hydrogen atom; it emits a proton of : (SWL 2018)**

(A) 3.04 eV (B) 13.6 eV (C) 10.20 eV (D) 10.4 eV

176. **Sub-atomic particles are divided into: (LHR 2006, 2019)**

(A) Photons (B) Leptons (C) Hadrons (D) All of these

177. **The building blocks of protons and neutrons are called: (LHR 2016)**

(A) Ions (B) Electrons (C) Positrons (D) Quarks

178. **The number of protons in any atom are always equal to the number of: (LHR 2016)**

(A) Neutrons (B) Electrons (C) Positrons (D) Mesons

179. **When a nucleus emits an alpha particle its atomic mass decreases by: (GRW 2016)**

(A) 1 (B) 2 (C) 3 (D) 4

180. **One gray (Gy) is equal to: (LHR 2019)(GRW 2016)**

(A) $1.6\times10^{-19} J$ (B) $1.6\times10^{-10}\frac{J}{kg}$ (C) $1\frac{J}{kg}$ (D) $4\frac{J}{kg}$

181. **Hydrogen bomb is an example of: (FSD 2009) (MTN 2018) (DGK 2018)**

(A) Nuclear fission (B) Nuclear fusion (C) Chemical reaction (D) Chain reaction

182. **Relation for half-life of any radioactive element is: (SGG 2016)**

(A) $T_{\frac{1}{2}} = \lambda(0.693)$ (B) $\lambda = T_{\frac{1}{2}}(0.693)$ (C) $T_{\frac{1}{2}} = \frac{0.693}{\lambda}$ (D) $T_{\frac{1}{2}} = \frac{\lambda}{0.693}$

183. **Speed of β particles is nearly equal to: (SGG 2016)**

(A) $\frac{1\times10^{7} m}{s}$ (B) $\frac{10^{7} m}{s}$ (C) $\frac{3\times10^{8} m}{s}$ (D) $\frac{10^{6} m}{s}$

184. **The dead time of Geiger Muller Counter is of the order of: (BWP2010) (GRW 2018)**

(A) Micro Second (B) milli second
(C) More than milli second (D) nano second

185. **The most useful tracer isotopes is: (D.G.K 2011) (MTN 2018)**

(A) Carbon – 14 (B) Cobalt – 60 (C) Iodine – 131 (D) Strontium – 90

186. **A pair of quark and anti-quark makes a: (GRW 2019) (MTN 2008)**

(A) Meson (B) Baryons (C) Photon (D) Proton

187. **Half-life of radium – 226 is: (MTN 2009, 2019)**

(A) 1820 years (B) 1940 years (C) 1620 years (D) 1680 years

188. **Half-life of iodine – 131 is 8 days and it weight 20 mg. After 4 half-lives, the amount left undecayed will be: (FSD 2019) (MTN 2011)**

(A) 2.5 mg (B) 1.25 mg (C) 0.625 mg (D) 0.312 mg

189. **Fission chain reaction is controlled by: (MTN 2016)**

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(A) Ductile substances (B) Hard substances (C) Brittle substances (D) Soft substances

123. Out of the following which material is brittle: (SWL 2018)

(A)Wrought Iron (B) Copper (C) Carbon steel (D) Tungsten

124. A diode characteristic curve is plotted between: (LHR 2016)

(A) Current and time
(B) Voltage and time
(C) Voltage and current
(D) Forward voltage and reverse voltage

125. Transistors are made from: (LHR 2016)

(A) Plastics
(B) Metals
(C) Insulators
(D) Doped semi-conductors

126. Two parallel wires carrying current in the same direction: (GRW 2016)

(A) Attract each other
(B) Repel each other
(C) Cancel their fields
(D) No effect on each other

127. For rectification we use: (GRW 2016)

(A) Transformer (B) Diode (C) Choke (D) Generator

128. Which factor doesn't affect the conductivity of PN junction diode (LHR 2019)

(A) Dropping (B) Temperature (C) Voltage (D) Pressure

129. Photo diode is used for detection of: (FSD 2009) (MTN 2018)

(A) Light (B) Heat (C) Current (D) Magnet

130. In full wave rectification no of diodes required are equal to: (SGD 2016)

(A) 3 (B) 4 (C) 5 (D) 1

131. Output resistance of an op-amp is: (SGD 2016)

(A) High (B) Zero (C) Low (D) Equal to input resistance

132. The potential barrier for Silicon at room temperature is: (BWP 2009, 2010)(GRW 2019)(DGK 2010)

(A) 0.9V (B) 0.3V (C) 0.7V (D) 0.8V

133. Conversion of AC into DC is called: (DGK 2009) (GRW 2018)

(A) Rectification (B) Amplification (C) Oscillation (D) Quantization

134. The mathematical notation for NAND gate is: (DGK 2011)(MTN 2009)

(A) $X = \overline{A + B}$ (B) $X = \overline{A.B}$ (C) $X = A + B$ (D) $X = A.B$

135. For non-inverting amplifier of $R_1 = \infty$ and $R_2 = 0$ Ohms, the gain of non-inverting amplifier is: (MTN 2010, 2019)(LHR 2018)

(A) 1 (B) zero (C) -1 (D) Infinite

136. The thickness of the base of the transistor is from: (LHR 2019)(MTN 2016)

(A) $10^{o}m$ (B) $10^{-6}m$ (C) $10^{-3}m$ (D) $10^{-6}\mu m$

137. The range of F.M transmission frequencies is from: (MTN 2016, 2019)

(A) 88 kHz to 108 kHz
(B) 88 MHz to 108 MHz
(C) 540 kHz to 1600 kHz
(D) 540 MHz to 1600 MHz

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